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UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Electrification Administration
Technical Standards Division

NEW ELECTRIC EQUIPMENT FOR THE FARM

Based upon Information Submitted by
Twenty-three State Agricultural Colleges,
State Experiment Stations, and other
Institutions

Compiled by
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Special Problems Section

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PURPOSE OF STUDY -

Scientists of State Agricultural Colleges and Experiment Stations have conducted considerable research involving the application of electricity to agriculture. This has resulted in the development of models of specific electric farm and home equipment. An attempt is made through this study to assemble and present these items for consideration for commercial development and quantity production by manufacturers. The letter of inquiry (Budget Bureau approval not required) giving further details follows.

"American manufacturers realize that after the war there will be a great market for electric equipment to be used by farmers to increase their income and improve their standard of living. Almost daily they ask REA for suggestions as to what electric farm and home equipment they should develop commercially for quantity production. Manufacturers are ready to spend time, effort and money on such activities.

Much research has been done by the colleges and other laboratories, resulting in new electro-agricultural equipment and improvements in the old. We understand that many such items are lying idle in college laboratories that should be brought off the shelf and placed in the hands of manufacturers so that they can be produced and made universally available to American farmers. If you have any developments of this nature in your laboratory, or know of others in the laboratories of other departments of your institution, which either are ready or even partly so for manufacturers' consideration, kindly inform us and furnish the details. We will do our best to locate competent manufacturers to discuss this equipment with you or the inventor, and make arrangements for manufacturing.

Please advise us as to policies relating to the securing of patents on items developed in your laboratory, either in the name of the inventor or the school, or both. Manufacturers sometimes hesitate to spend money on the development of a new item on which there is no patent or, at least, the necessary preliminary protection. If an item is patentable, manufacturers are generally willing not only to make a contract with the inventor but also to assume the expense of securing the patent.

We know that you will give us your full cooperation in this endeavor because the development of such electric equipment will be of inestimable value to the colleges, professors, manufacturers, as well as workingmen; and will assist in the reconversion of industry and employment of returning veterans."

NOTE - It is possible that some institutions interpreted the letter that only patented items were to be reported. That was not the case. It is true, however, that manufacturers oftentimes will not spend money on a new device unless it is patentable. Some of the institutions reporting have established definite procedures as to patenting inventions. These also form a part of this report.

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INSTITUTIONS REPORTING ON RESEARCH
RESULTING IN THE DEVELOPMENT OF
ELECTRIC FARM AND HOME EQUIPMENT

Professor Kyle Engler
Department of Agricultural Engineering
University of Arkansas
Fayetteville, Arkansas

We have developed and have in the process of patenting a farm sized rice drier, and without doubt, the university would be glad to have some company manufacture this drier for distribution and use among the rice growing states. I am enclosing a reprint describing this drier.

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I am enclosing a reprint of an article appearing in Agricultural Engineering for October, 1944. This will give you some information as to cost of drying rice. Also the author's opinion on the practicability of drying rice.

I have no definite figures on the number of rice farms in the United States. However, there are approximately fifteen hundred to seventeen hundred rice farmers in Arkansas. Each of the three other rice growing states, that is, Texas, Louisiana and California, has a comparable number of rice farms. Speaking for Arkansas, I would assume that a properly designed rice drier that could be sold for a cost compatible with that of our experimental drier would have an ultimate market of approximately seven hundred units.

The cost of producing our experimental Farm Unit Drier on a commercial basis has never been estimated; however, my judgment would indicate that a cost of something under one thousand dollars should set this drier up.

The most serious handicap to the extended use of artificial drying of combined rice, is the necessity of supplying large storage facilities which are necessary during the drying procedure.

We have done experimental work this year trying to determine whether it is possible to eliminate several of the drying steps that are now considered necessary. If this experimental work proves out, the storage problem will be materially reduced.

Professor Ben D. Moses
Division of Agricultural Engineering
University of California
Davis, California

You ask for information on material that we may have on hand that would be helpful in laying out postwar projects. The following is a list that may

be helpful:

<u>Farm Fruit Dehydrator</u>	- C-214 plan	\$ 1.29
<u>Community Dehydrator</u>	- C-216 plan	.53
<u>Mechanical Refrigeration for the Farm</u>		
35 cu. ft. plan	- C-152	
40 cu. ft. plan	- C-153	
80 cu. ft. plan	- C-154	
125 cu. ft. plan	- C-155	
(Each of these plans costs		.53
<u>Walnut Dehydrator</u>		
1.2 tons plan	- C-180	
1.8 tons plan	- C-181	
2.7 tons plan	- C-182	
(Each of these plans costs		.53

These plans can be obtained by writing Mr. C. F. Elwood, Extension Service, University of California at Berkeley.

We are working on an egg cooler of which I have written to you before and if we can possibly get the help or have time ourselves, we will get out drawings for it. Jim Tavernetti has published a circular on the "debeaker", a copy of which is enclosed.

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With reference to the continuous soil sterilizer I wish to say that we have found it quite satisfactory for propagating uses. The Truck Crops Division has had one built for their use and like it very much.

Now as to how generally it can be used, that is another thing. They are suitable for laboratory use and probably would be very serviceable in nurseries and commercial greenhouses. I see no reason why there should not be a good many of them used, but whether it is enough for some manufacturer to take hold of, I am not prepared to say. It might be well first to make some kind of survey of the number of greenhouses that sterilize their soil.

Dr. J. B. Davidson, Head
Department of Agricultural Engineering
Iowa State College
Ames, Iowa

I feel that the electric motor has not been utilized as effectively as it might have been through failure to capitalize on its special characteristics. By these characteristics I mean: first, control; either automatic or remote; second, light weight; third, self-starting characteristics; and fourth, safety. When these characteristics are utilized, it is easy to arrange automatic controlled feed grinding devices. We described such an outfit in one of our earlier publications and its use seemed to us to be very satisfactory.

The electric motor is well adapted to use in a winch in an electric hoist.

The attached circular indicates a gasoline engine as being used for this purpose. Electric brooders are worthy of further development. An air compressor for the farm would be a useful piece of equipment for inflating tires and for spraying.

Professor D. E. Wiant
Agricultural Engineering Department
Michigan State College
East Lansing, Michigan

The equipment which would probably appeal to the manufacturer most are the four types of elevators, conveyor type small grain elevator, the vertical cup type elevator, the ear corn elevator and the combination ear corn and small grain elevator. Representatives of several manufacturers have gone over the details of these four items, and several manufacturers expressed a decided interest in them. Several types of these elevators have been manufactured in Michigan by local lumber yards for several years, however, this, cares for the local demand only. Two or three of the larger manufacturers have expressed an interest in two of these elevators, but have not yet stated definitely whether or not they would manufacture them. One manufacturer is considering one of the large mail order houses as an outlet for this equipment. I shall send you copies of bulletins describing these elevators under separate cover.

We have realized for some time that the quickest way to get this equipment in the hands of the farmer is to get it manufactured, of course, the last several years have not been very conducive to this practice, but we feel that the little bit that we can do will be far from sufficient. For that reason, we should be very glad to give you all the cooperation we can.

Professor J. C. Wooley, Head
Agricultural Engineering Department
University of Missouri
Columbia, Missouri

Professor M. M. Jones and myself did a considerable amount of work on a device to meter different feeds into a feed grinder. We have on this meter six different divisions; one for corn, another for oats, the third for barley, fourth for linseed meal, the fifth for cottonseed meal, and the sixth for bone meal and salt. This metering device was placed under a number of hopper bins so that the work of mixing and grinding was all done in the one operation. The Dairy Department used this for about six weeks in mixing and grinding all of their feed. So long as atmospheric conditions remained uniform we were able to mix the ration so that there would not be more than a very few pounds of any one grain left at the end of a one-hour run.

I believe this metering device has a lot of possibilities for use on farms. Our Dairy Department was very particular about the different ingredients in their ration because many of the mixtures were used in experiments. I believe this outfit would encourage farmers to make up a balanced ration utilizing most of their own feeds. The fan on the hammer mill did most of

the mixing and therefore all of these products which are already ground should be introduced below the hammer mill itself. It might be that a manufacturer would find it necessary to increase the capacity of the fan in order to prevent decreasing the capacity of the whole mill. We would like to place this equipment with some company so that the patents would be issued in Professor Jones' and my name, and the royalties to come to us or to the Agricultural Foundation of the College. I will enclose a picture of this set-up as it will give you a better idea of the equipment.

If you would help us in getting this machine on the market I assure you we would appreciate it very much.

Professor W. C. Krueger
Department of Agricultural Engineering
Rutgers University
New Brunswick, New Jersey

Under date of July 1935, two patents were issued the University as a result of our work and suggestions in connection with greenhouse practice. Patent 2,060,735 "Method and Means for Applying Nutrient Solution to Plants" involving the application of nutrient solutions by mechanical and controlled means to the sand or gravel or other supporting medium in which the plants grow.

Patent 2,036,416 deals with apparatus and process for soil pasteurization by means of electrified grid impressed into the soil of greenhouse flats and depending on the flow of current from the conducting soil medium for heating by resistance.

Both of these ideas have been subjected to practical installation. Sub-irrigation with nutrient solution does not lend itself particularly to retail manufacture sales except for the chemical mixing and pumping and control unit. This, however, would be of sufficient value to interest certain types of manufacturers.

The pasteurizer unit lends itself beautifully to manufacture unit sales. It is ideally adapted for the processing of flats used in greenhouses and by vegetable gardeners for starting plants. It eliminates re-handling of soil and possibly recontamination and the unit can be constructed and sold for a figure well within practical worth limits. Both patents have been assigned to the Rutgers Endowment Foundation and details regarding their release and policies might well be handled direct with the Foundation here at New Brunswick or with A.D.T. Libby, Federal Trust Building, 24 Commerce Street, Newark, N. J.

Professor I. P. Blauser
Extension Agricultural Engineer
Agricultural Engineering Department
Ohio State University
Columbus, Ohio

Right at the present time, farm elevators that will handle practically any farm product are very much in demand and I think there is a field there for

some manufacturer to take some of the designs that are now quite common and build an elevator that will handle many different types of products. No doubt, many farmers will still want to build their own elevators but I believe, by and large, the far greater number will much prefer to buy the unit already built.

Two years ago at our Farmers' Week, I had on display an elevator for which we have plans. During the Farmers' Week, I probably could have sold the elevator to a hundred different farmers had we had them available and that points to me that most farmers will want to, and probably should, buy commercial units rather than attempt to build their own.

Some years ago, Professor Dakan had developed an electric brooder and I believe he applied for a patent on it. I am not sure that it was ever completed. It seemed that the cost of manufacturing was pretty high and so I believe no further development work was done on it.

Professor F. E. Price, In Charge
Agricultural Engineering Department
Oregon State College
Corvallis, Oregon

There is a device which has been developed by a young mechanical engineer who worked for the Bureau of Agricultural Engineering here at Corvallis, since resigned, that might be of interest. He developed a device for automatic feed flow regulator for a small electric feed grinder. It could be used for any size feed grinder, although in the rural electrification field it will vary from one to five horsepower usually. I am quite sure that he has patented this and I will try to contact him in the near future and find out if he is interested in locating a manufacturer.

Professor R. U. Blasingame, Head
Department of Agricultural Engineering
Pennsylvania State College
State College, Pennsylvania

We have developed an electric portable elevator which will handle ear corn, baled hay and small grain. At the present time it is in the hands of a Pennsylvania manufacturer who contemplates making it a part of their postwar manufacturing program.

Under separate cover I am sending you a circular on this elevator. There are no patents connected with it.

Professor L. J. Smith, Head
Department of Agricultural Engineering
State College of Washington
Pullman, Washington

I am enclosing a report summarizing the various projects and activities of our Committee during its twenty years of continuous operation. These reports and the bulletins listed may give you some idea in regard to

manufacturing of farm equipment. Potato sorters, electric hotbeds, home-made hay hoists, potato and vegetable washers, elevation devices, pig and lamb brooders, driers,--these are some developments which might well be worked over on a commercial scale.

Professor F. W. Duffee, Chairman
Department of Agricultural Engineering
University of Wisconsin
Madison 6, Wisconsin

We have nothing in mind at this time except the electrically heated and automatically controlled pressure cooker which I have already discussed with you.

INSTITUTIONS REPORTING NO DEVELOPMENTS
OF ELECTRIC FARM AND HOME EQUIPMENT

Professor R. H. Driftmier, Head
Department of Agricultural Engineering
University of Georgia
Athens, Georgia

Mr. J. G. Woodroof
Food Technologist
Georgia Agricultural Experiment Station
Experiment, Georgia

Professor E. W. Lehmann, Head
Department of Agricultural Engineering
University of Illinois
Urbana, Illinois

Professor J. B. Kelley, Head
Department of Agricultural Engineering
University of Kentucky
Lexington, Kentucky

Professor C. I. Gunness, Head
Department of Engineering
Massachusetts State College
Amherst, Massachusetts

Professor O. W. Monson
Department of Rural Engineering
Agricultural Experiment Station
Montana State College
Bozeman, Montana

Professor D. S. Weaver, Head
Department of Agricultural Engineering
North Carolina State College of
Agriculture
Raleigh, North Carolina

Professor W. J. Promersberger, Chairman
Department of Agricultural Engineering
North Dakota Agricultural College
State College Station
Fargo, North Dakota

Dr. Edmund Secrest, Director
Ohio Agricultural Experiment Station
Wooster, Ohio

Dr. M. H. Campbell, Dean
Rhode Island State College
Kingston, Rhode Island

Professor M. A. Sharp, Head
Agricultural Engineering Department
University of Tennessee
Knoxville, Tennessee

Mr. H. G. Fisk, Director
Natural Resources Research Institute
University of Wyoming
Laramie, Wyoming

PATENT PROCEDURES OF STATE AGRICULTURAL COLLEGES

University of Arkansas

There is no established policy here at the University of Arkansas concerning the securing of patents. However, since our department has developed the rice drier, which is now in process of being patented, some policy will have to be established.

I would suggest that you write Mr. L. L. McKeehan, our business manager, for a reply to this question.

University of Georgia

The University of Georgia does not have any policy relating to the securing of patents.

Iowa State College

Although we have a provision for taking out patents on mechanical developments from our experimental work, we do not have any patents at the present time in this particular area.

Michigan State College

Regarding patents, none of this equipment has been patented, at least not by the College. We have sent out plans for a baled hay elevator and were very much surprised to find that a small Michigan manufacturer has taken out patent on an elevator which is as near as we can tell after our plans. When this situation is straightened up, then we may adopt a definite policy regarding the equipment.

University of Missouri

We would like to place this equipment with some company so that the patents would be issued in Professor Jones' and my name, and the royalties to come to us or to the Agricultural Foundation of the College.

Montana State College

In regard to obtaining patents to new developments, it would be very helpful to us to be fully informed as to what constitutes a patentable idea and what procedure should be followed in order to obtain a patent in the name of the institution where the idea was developed. Any advice which you are able to give us along this line will be appreciated.

Rutgers University

Both patents have been assigned to the Rutgers Endowment Foundation and details regarding their release and policies might well be handled direct with the Foundation here at New Brunswick or with A.D.T. Libby, Federal Trust Building, 24 Commerce Street, Newark, N. J.

North Carolina State College of Agriculture

In regard to the policies relating to the securing of patents on items developed at this college, I will state that we are now taking out a patent in the name of the college. The employee of the college who invented and perfected the machine assigned his interest to the college. We are licensing the manufacturer to make the item subject to certain conditions. We had already taken care of the expense of securing the patent before we contacted the present manufacturer. I believe he would, however, have assumed the expense of securing the patent if it had not already been done.

Ohio State University

We have not taken out any patents on any of the homemade equipment that we have been working with.

State College of Washington

In general, the policy at our institution is that, if anything should be developed of a patentable nature in connection with the work of the individual while he is under pay at the institution, the patent would be taken out by the institution. This is a pretty general practice.

University of Wyoming

Our policy regarding patents will depend somewhat on the individual case but generally speaking where investigations are entirely financed by an outside sponsor the patent will be assigned to the individual or company underwriting the research investigation leading to the patent. On the other hand if an outside sponsor only partly finances the investigation the patent will be assigned to the University and the sponsor will receive a free but non-exclusive license for the use of the patent. Patents resulting from researches financed entirely by the Natural Resources Research Institute will be assigned to the University and license will be granted for a consideration decided upon at the time that the licensing arrangement is entered into between the company or licensee and the University.

ACKNOWLEDGMENTS

The Rural Electrification Administration gratefully acknowledges the invaluable assistance received from professors of State Agricultural Colleges and Experiment Stations engaged in research involving applications of electricity to agriculture. This report was made possible only through their cooperation in supplying the information contained therein.

